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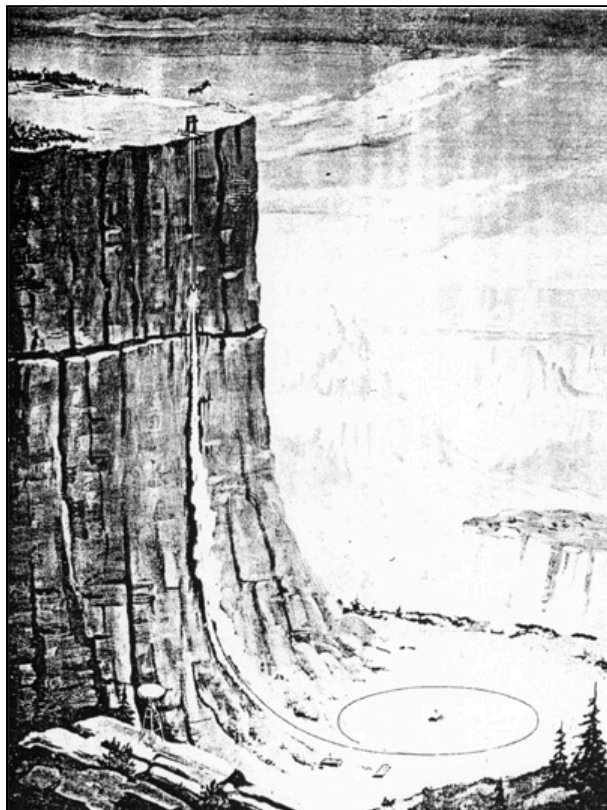


Figure 1-23, "View from Flight Simulator" from Document 1.

Soldiers, Spies and the Moon: Secret U.S. and Soviet Plans from the 1950s and 1960s

Declassified Documents Reflect the Covert Side of Lunar Programs

Posting Marks 45th Anniversary of First Human on the Moon

National Security Archive Electronic Briefing Book No. 479

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Edited by Jeffrey T. Richelson

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Earth rising behind the moon. (Photo courtesy of NASA, Lewis Research Center)



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Washington, DC, July 20, 2014 – Forty-five years ago, astronaut Neil Armstrong took his "one small step" for mankind, becoming the first person to set foot on the moon. The program that resulted in that historic event — managed by the National Aeronautics and Space Administration (NASA) — had been a very public one ever since its announcement by President John F. Kennedy in 1961. Even the Soviet government had publicized aspects of its own effort.

But there were also highly secret elements to the U.S. and Soviet schemes, which are the subject of today's National Security Archive posting of previously classified records. The documents focus on three topics — early U.S. military plans, including the possibility of conducting nuclear tests in space, the use of the moon to reflect signals for military or intelligence purposes, and U.S. intelligence analyses and estimates of Soviet missions and their intentions to land a man on the lunar surface.

The posting includes:

- Army and Air Force studies from 1959 - 1961 on the creation of a military lunar base, with possible uses as a surveillance platform (for targets on earth and space) and the Lunar Based Earth Bombardment System ([Document 1a](#), [Document 1b](#), [Document 3](#), [Document 4](#)).
- A study on the detonation of a nuclear device on or in the vicinity of the moon ([Document 2](#)).
- The use of the lunar surface to relay signals from Washington to Hawaii and from U.S. spy ships ([Document 15](#)).
- Collection of Soviet radar signals after they bounced off the moon — a technique known as Moon Bounce ELINT ([Document 11](#), [Document 14](#)).
- The U.S. theft and return of a Soviet space capsule during an exhibition tour ([Document 13](#)).
- A 1965 estimate of Soviet intentions with regard to a manned moon landing ([Document 5](#)).
- Several analyses of Soviet Luna missions, including Luna 9 — the first mission to result in a soft landing on the moon ([Document 6](#), [Document 7](#), [Document 8](#), [Document 10](#), [Document 16](#)).

* * * *

Soldiers, Spies, and the Moon

By Jeffrey T. Richelson

On July 20, 1969, Neil Armstrong became the first person to set foot on the moon, an event watched by a worldwide audience of approximately 600 million people.

Armstrong's "one small step" was the result of a prolonged and intense campaign initiated when President John F. Kennedy told Congress on May 25, 1961, that "this nation should commit itself to achieving the goal, before the decade is out, of landing a man on the moon and returning him safely to the earth."¹



The prolonged and public U.S. effort that resulted in Armstrong's arrival on the lunar surface took place along with a competing Soviet program that involved spacecraft in lunar orbit as well as unmanned landings. While the U.S. had attained a number of important firsts with regard to the secret efforts to employ space for military, particularly intelligence, purposes, the Soviets had beat the United States in the more visible achievements of placing a spacecraft in orbit (Sputnik) and a man in space (Yuri Gagarin on April 12, 1961). For much of the U.S. effort there was the concern that the Soviet astronauts would also arrive on the moon first.

While the U.S. civilian program to reach the moon, and some details of the Soviet one, were public, there were other aspects of the race to the moon that were more secretive. They included the details of earlier proposals for military activities on or near the moon, the ability to use "moonbounce" for intelligence or communications purposes, and the U.S. intelligence community's attempt to collect and analyze information about the Soviet lunar program.

Lunar Bases and Detonations

Before the mission of landing a man on the moon was definitively assigned to the civilian National Aeronautics and Space Administration, both the Army and the Air Force lobbied to establish outposts on the moon. A two-volume Army study ([Document 1a](#), [Document 1b](#)), *Project Horizon*, argued that there was a need for a military moon base that would be used to develop techniques for surveillance of both earth and space, communications relay, and operations on the lunar surface. The study examined not only the technical aspects — the necessary space transportation system, its launch, construction of the base, and communications — but political, management, policy and legal implications.

One Air Force study ([Document 3](#)), produced by the service's Ballistic Missile Division in April 1960, had alternative titles — one classified (*Military Lunar Base Program*) and one unclassified (*S.R. 183 Lunar Observatory Study*). It laid out a six-phase effort, beginning in November 1964 and concluding with a lunar base becoming operational in June 1969. Among the options being considered, according to the study, was a Lunar Based Earth Bombardment System. The second Air Force study ([Document 4](#)), published in May 1961, was the Air Force Systems Command's *Lunar Expedition Plan* — *LUNEX*. A key reason for such an expedition was to demonstrate that the United States could successfully compete with the Soviets in the technology sphere.

A different potential military use of the moon was found in a study ([Document 3](#)) produced by Leonard Reiffel of the Armour Research Institute at the Illinois Institute of Technology in 1959. Its title, *A Study of Lunar Research*

Flights, did not reveal the proposed purpose of those flights — to deliver a nuclear device to the surface or to the vicinity of the moon, where it would be detonated. Also involved in the study effort was the yet-to-become-famous astronomer Carl Sagan. Many years later, Reiffell said that the "foremost intent [of such a detonation] was to impress the world with the prowess of the United States" and that the Air Force ended the project when its leadership decided the risks exceeded the potential benefits.²

Moonbounce



Footprint left on the moon by an Apollo 11 astronaut. (Photo courtesy of NASA Langley Research Center)

While NASA's lunar program helped preclude — undoubtedly along with international political considerations — any military service ambitions to establish an outpost on the moon, the military and the Intelligence Community found at least two ways, after 1961, to make use of the moon without leaving Earth. Both approaches involved signals bounced off the moon, a possibility that had been confirmed by experiment as early as 1946.

In one case, the U.S. was purposefully bouncing signals off the Moon as a means of relaying intelligence information. Carried on-board U.S. Navy signals intelligence ships, such as the U.S.S. *Liberty*, was a system designated TRSSCOMM — Technical Research Ship Special Communications — a successor to the Communications Moon Relay (CMR) system established in 1956 to relay

teletype and facsimile messages between Washington, D.C. and Hawaii ([Document 15](#)). As James Bamford reported, TRSSCOM consisted of a "sixteen-foot, dish-shaped antenna mounted on a movable platform and capable of bouncing a 10,000-watt microwave signal off a particular spot on the moon and down either to the receiving station at Cheltenham, Maryland or to one of the other Navy SIGINT ships." He also noted that, while the system had the advantage of allowing large volumes of information to be transmitted without giving away the location of the ship carrying out the transmissions, it seldom worked properly.³

In the second case, as explained in two articles ([Document 11](#), [Document 14](#)) in the CIA's *Studies in Intelligence* journal, the United States Intelligence Community was intercepting signals from Soviet anti-ballistic and air defense radar systems after they had exited the Earth's atmosphere and bounced off the moon. The CIA employed a 150-foot dish antenna at Stanford University in Palo Alto, California to monitor Soviet radar signals reflected off the moon, while the National Security Agency used the Arecibo Ionospheric Observatory in Puerto Rico to intercept signals that had originally been transmitted from a Soviet Arctic Coast radar. The Air Force also had its own moonbounce project — designated FLOWER GARDEN — which relied on several antennas, including the 250-foot antenna at Jodrell Bank Radio Observatory in England. Other moonbounce antennas were located at Sugar Grove, West Virginia, and the Naval Research Laboratory's Chesapeake Bay Annex. The latter made the first intercept of a signal from the Soviet Hen House radar.⁴

Monitoring the Soviet Lunar Program

While NASA pursued its lunar program, the U.S. Intelligence Community closely monitored the entire Soviet space program, including its lunar component. The declassified documents in this posting concern a number of aspects of that effort — collection through a variety of means, different levels of analysis, and analysis of specific missions.

Two very different collection activities are the subjects of two *Studies in Intelligence* articles. One, published in 1964 ([Document 6](#)), examined the interception of Soviet space pictures that had been transmitted from their assorted space programs — including Sputnik, Cosmos, and Lunik — to stations in the Soviet Union. A second, published three years later ([Document 13](#)), involved a more unconventional approach - the temporary theft of a Lunik spacecraft that was part of an exhibition of Soviet industrial and economic achievements in an unspecified country.

Early in the U.S. lunar program, in April 1963, the CIA's Office of National Estimates, the forerunner of today's National Intelligence Council, explored the subject of Soviet intentions concerning a manned lunar landing ([Document 5](#)). It reviewed relevant developments in the Soviet program as well as tried to assess the extent of the Soviet commitment to beating the U.S. to the moon.

One particular mission — the Luna 9 mission of February 1964 — produced a number of different classified publications. Two of those ([Document 7](#), [Document 8](#)) followed closely after the mission and were intended to provide reasonably current intelligence. One ([Document 7](#)) was an assessment of the entire mission, while the other ([Document 8](#)) was more narrowly focused — a preliminary technical analysis of Luna 9 photography performed by the National Photographic Interpretation Center (NPIC) at the request of the CIA's Foreign Missile and Space Analysis Center (FMSAC). (A similar study ([Document 12](#)) with regard to Luna 13 photography was also produced by NPIC at FMSAC's request).⁵

Two articles published in CIA and NSA journals represented retrospective accounts concerning the Luna 9 collection and analysis effort. One ([Document 16](#)) recounted in the NSA's *Cryptologic Almanac* the author's participation in intercepting and processing Luna 9 imagery. Another ([Document 10](#)) contains a broader account of the U.S collection and analysis effort concerning Luna 9 and the years preceding it.

Overview

Much of the U.S. lunar program that followed President Kennedy's decision to assign NASA the responsibility to send men to the moon was conducted openly — but there are other aspects of U.S. plans with regard to the moon are revealed, at least in part, by declassified documents.

The Soviet lunar program was only one part of the Soviet space program, which involved launch facilities and vehicles, production facilities, earth-orbiting military and civilian spacecraft, and interplanetary probes to Mars and Venus.⁶ While Soviet military satellites were the most important targets due to their potential threat to U.S. national security, the Cold War competition between the United States and Soviet Union meant that space exploration efforts, even if devoid of military activities, were significant elements of the propaganda war — which made them important targets for the U.S. Intelligence Community, a story which is also partially told by declassified documents.

THE DOCUMENTS

Document 1a: United States Army, *Project Horizon, Volume I: Summary and Supporting Considerations*, March 20, 1959. Classification Not Available.

Source: www.history.army.mil

Document 1b: United States Army, *Project Horizon, Volume II: Technical Considerations and Plans*, March 20, 1959. Classification Not Available.

Source: www.history.army.mil

This two-volume study was based on the Army's premise that "there is a requirement for a manned military outpost on the moon" and that outpost was required to develop techniques in moon-based surveillance of the earth and space, in communications relay, and in operations on the lunar surface. Volume I consists of four chapters (introduction, technical considerations and plans, management and planning considerations, non-technical supporting considerations) and three appendices (U.S. space policy, legal and political implications, and technical services support capabilities). The second volume, fully

focusing on technical considerations, examines the possible outpost, the space transportation system required, communications, the launch site, program logistics, research and development, and program cost and schedule.

Document 2: L. Reiffel, Armour Research Foundation, Illinois Institute of Technology, *A Study of Lunar Research Flights, Volume I* (Kirtland Air Force Base, New Mexico: Air Force Special Weapons Center, June 19, 1959). Classification Not Available.

Source: www.dtic.mil

This volume focuses on the possibility of a nuclear detonation on or near the moon's surface. The introduction notes the possibility that both scientific and military purposes would be advanced — including information on the space environment as well as the capability of nuclear weapons for space warfare. The chapters of volume I focus on optical studies concerning the nuclear device's trip to the moon, the blast, and the thermal conductivity of the lunar surface; seismic observations on the Moon; the lunar radiation environment; the Moon's magnetic field; and other topics. Two, probably classified/sensitive, chapters are contained in Volume II.

Document 3: Air Force Ballistic Missile Division, *Military Lunar Base Program (C) or S.R. 183 Lunar Observatory Study (U), Volume I: Study Summary and Program Plan*, April 1960. (Extract)

Source: Air Force Freedom of Information Act Release

This volume summarizes a study whose objective was to "determine an economical and sound approach for establishing a manned intelligence observatory on the moon" — with technical requirements being the subject of Volume II. It delineates a six-phase effort beginning with lunar probes in late 1964 and progressing through lunar orbits, a soft lunar landing, lunar landing and return, manned vehicle development, and concluding with an operational lunar base in June 1969. It also states that decisions concerning the types of strategic systems to be placed on the moon (including a Lunar Based Earth

Bombardment System) could be safely deferred for three to four years.

Document 4: Air Force Systems Command, *Lunar Expedition Plan - LUNEX* , May 1961. Secret.

Source: Air Force Freedom of Information Act Release

This document identifies the purpose of a Lunar Expedition as being manned exploration of the moon with first landing and return in late 1967. It asserts that "this one achievement if accomplished before the USSR, will serve to demonstrate conclusively that this nation possesses the capability to win future competition in technology." Its main sections provide a program description, and discuss master schedules, development and production, budget matters, program management, materiel support, engineering, personnel and training, and intelligence matters.

Document 5: Office of National Estimates, Central Intelligence Agency, Memorandum for the Director, Subject: Soviet Intentions Concerning a Manned Lunar Landing, April 25, 1963, Top Secret/ DINAR [DELETED] RUFF .

Source: CIA Records Search Tool (CREST), National Archives and Records Administration, College Park, Maryland.

The summary to this estimate notes the uncertainty about Soviet intentions with regard to a moon landing: while repeating the Office of National Estimate's previous view that the odds were better than even that the Soviets would seek to beat the U.S. to moon, it also states that it was possible "Soviet lunar objectives are less ambitious." The authors examine the resumption of Soviet unmanned lunar launchings, Soviet statements concerning a manned lunar landing, an analysis of Soviet ground facilities, and offer conclusions.

Document 6: Henry G. Plaster, "Snooping on Space Pictures," *Studies in Intelligence*, Fall 1964, pp. 31-39. Secret.

Source: www.foia.cia.gov

One component of the U.S. Intelligence Community's effort in gathering intelligence on the Soviet space program was intercepting the signals, including video, from Soviet spacecraft. This article reports on the efforts and results with regard to a variety of categories of Soviet spacecraft operations - Sputnik, Cosmos, and Lunik. Included is a discussion of the efforts with regard to Lunik III's video of the lunar surface.

Document 7: Office of Scientific Intelligence, Directorate of Science and Technology, "Preliminary Analysis of Luna 9," *Scientific Intelligence Digest*, March 1966. Top Secret.

Source: CIA CREST

This heavily redacted article, which appeared in a journal of the CIA's Directorate of Science and Technology, focuses on the Soviet Luna 9 mission — which concluded with the first soft landing on the moon and the transmission of images of the lunar surface. Portions of the article cover the configuration of the Luna 9 spacecraft, its missions, and the implications of radiation measurements on the Moon for human safety.

Document 8: National Photographic Interpretation Center, NPIC/R-5017/66, *Preliminary Analysis of Luna-9 Photography*, June 1966. Secret.

Source: CIA CREST

In response to a request from the CIA's Foreign Missile and Space Analysis Center, the agency's National Photographic Interpretation Center produced a preliminary analysis of the photography transmitted by the Soviet Luna 9 spacecraft. The analysis focused on the spacecraft's photographic system, the spacecraft, and identifying new information on the lunar surface.

Document 9: Carl Berger, USAF Historical Liaison Division Office, *The Air Force in Space, Fiscal Year 1961*, April 1966 (Extract). Secret.

Source: Air Force Freedom of Information Act Release

This extract titled "Man on the Moon - A National Objective" notes that the Air Force was concerned over "the apparent inadequacy of our current National Space Program" and reports that the "Air Force said that long-time studies showed convincingly that an orderly and phased lunar expedition culminating in a 1967 landing and return was perfectly feasible."

Document 10: James Burke, "Seven Years to Luna 9," *Studies in Intelligence*, 10 (Summer 1966), pp. 1-24. Secret.

Source: <http://isulibrary.isunet.edu>

This article also concerns the 1966 Luna 9 mission, examined more narrowly in earlier reports ([Document 7](#), [Document 8](#)). Its purpose is "to tell the story of how intelligence kept track of that effort through the collection and analysis of telemetric and other information." The author covers a number of events and activities leading up to the mission and the U.S. collection effort — the early lunar program, Soviet launch vehicles, collection and prediction through 1961, US. deep-space collection, Soviet planetary shots in 1962, and Soviet space launches in 1964 and 1965 — and then the Luna 9 mission itself.

Document 11: Frank Eliot, "Moon Bounce ELINT," *Studies in Intelligence* 11, 2 (Spring 1967): 59-65. Secret.

Source: www.foia.cia.gov

While the moon figured in purely hypothetical plans to collect intelligence from the lunar surface, it was employed, in a different way, in an actual effort to gather intelligence on Soviet anti-aircraft and anti-ballistic missile radars. That technique, recounted in this article, was based

on the 1946 detection of a man-made signal reflected off the moon.

Document 12: National Photographic Interpretation Center, NPIC/R-5015/67, *Analysis of Luna-13 Photography*, July 1967. Secret.

Source: CIA CREST

As with Document 8, this NPIC report was a response to a request from the Foreign Missile and Space Analysis Center for an analysis of the video signals transmitted by a Soviet lunar spacecraft — focusing on the photographic system, the spacecraft, and the lunar surface.

Document 13: Sydney Wesley Finer, "The Kidnaping of the Lunik," *Studies in Intelligence*, 11, 3 (Winter 1967), pp. 33-39. Secret.

Source: <http://media.nara.gov>

While a common source of intelligence on Soviet space, including lunar, efforts was collected through satellite photography and electronic intercepts, a more unusual and less frequent source is described in this article. It describes how the CIA "borrowed," examined, and returned a Soviet Lunik spacecraft that was part of an exhibition touring several countries to promote Soviet industrial and economic achievements.

Document 14: N.C. Gerson, "SIGINT in Space," *Studies in Intelligence*, 28, 2 (Summer 1984). Secret.

Source: Author's collection

Among the topics discussed in this article is the author's work on the "moonbounce" phenomenon and the possibility of establishing an intercept site on the moon.

Document 15: Applied Research Laboratory, Pennsylvania State University, *From the Sea to the*

Stars: A Chronicle of the U.S. Navy's Space and Space-related Activities, 1944-2009, 2010. Unclassified.
(Extract)

Source:

www.history.navy.mil/space/FromTheSeaToTheStars-2010ed.pdf

These pages from an official history discuss two attempts to use the moon as a communication relay — the establishment of a Communications Moon Relay (CMR) system in 1956 for transmission of teletype and facsimile messages between Washington, D.C. and Hawaii, and the Technical Research-Ship Special Communications (TRSSCOM) for "spy ship" communications.

Document 16: John O'Hara, "Luna 9, the First Soft Landing on the Moon," *Cryptologic Almanac*, January - March 2003. Unclassified/For Official Use Only.

Source: www.nsa.gov

This article, from a National Security Agency journal, focuses on NSA's role, and particularly that of the author, in intercepting and processing the images from the Luna 9 spacecraft — and in delivering them to the president's desk that afternoon.

Notes

[1] William E. Burrows, *This New Ocean: The Story of the First Space Age* (New York: Random House, 1998), p. 330.

[2] William J. Broad, "U.S. Planned Nuclear Blast on the Moon, Physicist Says," *New York Times*, May 16, 2000, p. A15; Keay Davidson, *Carl Sagan: A Life* (New York: Wiley, 1999), pp. 94-95.

[3] James Bamford, *The Puzzle Palace: A Report on NSA, America's Most Secret Agency* (Boston: Houghton, Mifflin Company, 1982), p. 219.

[4] Jeffrey T. Richelson, *The Wizards of Langley: Inside the CIA's Directorate of Science and Technology* (Boulder, Co.: Westview Press, 2001), pp. 89-90.

[5] On the Luna program see, William E. Burrows, *Exploring Space: Voyages in the Solar System and Beyond* (New York: Random House, 1990), pp. 160-163.

[6] A future National Security Archive Electronic Briefing Book will cover U.S. Intelligence efforts focusing on the other elements of the Soviet space program.

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